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Absolute Rate Theories of Epigenetic Stability ALEKSANDRA M. WALCZAK, JOSE N. ONUCHIC, PETER G. WOLYNES, Center for Theoretical Biological Physics, UCSD — Spontaneous switching events in most characterized genetic switches are rare, resulting in extremely stable epigenetic properties. We show how simple arguments lead to theories of the rate of such events much like the absolute rate theory of chemical reactions corrected by a transmission factor. Both the probability of the rare cellular states that allow epigenetic escape, and the transmission factor, depend on the rates of DNA binding and unbinding events and on the rates of protein synthesis and degradation. Different mechanisms of escape from the stable attractors occur in the nonadiabatic, weakly adiabatic and strictly adiabatic regimes, characterized by the relative values of those input rates.

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